First Release

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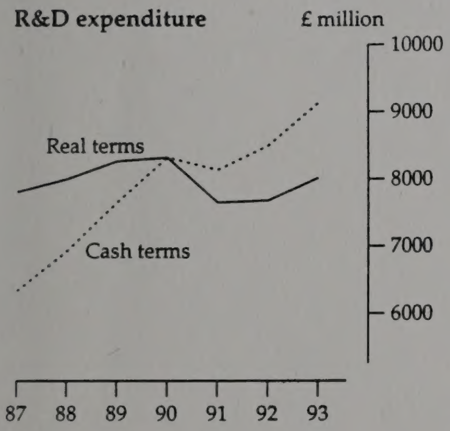
Business Enterprise Research and Development 1993

Value of R&D performed by Business Enterprises

	£ million					percentage change
	1989	1990	1991	1992	1993	89-93
In cash terms						
Civil	5923	6557	6669	7092	7767	+31
Defence	1727	1761	1466	1397	1359	-21
Total	7650	8318	8135	8489	9126	+19
In real terms						
Civil	6398	6557	6274	6417	6819	+7
Defence	1865	1761	1379	1264	1193	-36
Total	8263	8318	7654	7681	8012	-3

R&D expenditure



The 1993 results are from a large scale survey of business R&D. Comparisons in this release are made with the previous large survey in 1989, although estimates based on smaller surveys have been made for the intervening years.

In 1993, in cash terms and compared to 1989:

- Total expenditure increased by 19% to £9.1 billion.
- Civil expenditure increased by 31% to £7.8 billion.
- Defence expenditure decreased by 21% to £1.4 billion.

In 1993, in real terms and compared to 1989:

- Total expenditure decreased by 3%
- Civil expenditure increased by 7%
- Defence expenditure decreased by 36%

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Expenditure on R&D performed in UK businesses: cash and real terms; 1986 to 1993 (Table 1)

In 1993, £9.1 billion was spent on R&D performed within UK businesses - a rise of 19 per cent at current prices compared to 1989. In real terms (using the GDP deflator) expenditure decreased by 3 per cent. In both years the expenditure was about 1.5 per cent of GDP.

Expenditure on R&D performed in UK businesses: product groups, 1986 to 1993 (Tables 2 and 3)

The product group with the largest R&D expenditure was pharmaceuticals: expenditure in 1993 was £1,651 million, 18 per cent of all spending. Information by product group for earlier years has been estimated on the new product group classification used in this table (see notes).

Sources of funds for R&D performed in UK businesses: 1986 to 1993 (Table 4)

This table identifies, for the first time in a CSO publication, funding of R&D in UK businesses by the EU Commission through its schemes to support R&D in the European Union. This amounted to £220 million in 1993. Other funding from overseas (ie excluding funds from the EU Commission) was £1,181 million - slightly more than funding from the UK Government.

Business funding of R&D remained at over 70 per cent of the total from all sources.

Current and capital expenditure on R&D performed in UK businesses: 1986 to 1993 (Table 5)

Comparing 1989 and 1993, capital expenditure and current expenditure as a proportion of total expenditure have remained the same, at 11 per cent and 89 per cent respectively.

Salaries and wages accounted for 49 per cent of current expenditure in 1993 (47 per cent in 1989).

Employment on R&D performed in UK businesses, 1986 to 1993 (Tables 6 & 10)

The number of staff employed on R&D declined by 6 per cent between 1989 and 1993. Within that total the number of scientists and engineers increased by 2 per cent, whilst the number of support staff fell by 14 per cent.

Staff working on civil R&D rose 4 per cent between 1989 and 1993; this was more than offset by a 42 per cent fall in those working on defence R&D.

Expenditure on R&D performed within UK businesses: civil and defence, by broad product group, 1989 to 1993 (Table 7)

Chemical products and service businesses account for over half of civil R&D. Defence R&D is dominated by aerospace and electrical products where there were sharp falls in expenditure between 1989 and 1993.

Sources of funds for R&D performed in UK businesses: civil and defence; 1989 to 1993 (Table 8)

The funding for civil R&D shows a different pattern from that of defence R&D. In 1993 54 per cent of defence R&D was funded by Government, compared to 58 per cent in 1989. In both years, Government funding of civil R&D was 5 per cent of the total from all sources.

Current and capital expenditure on R&D performed in UK businesses: civil and defence; 1989 to 1993 (Table 9)

Capital expenditure as a proportion of total expenditure on civil R&D remained the same in 1993 as in 1989 at 13 per cent. Capital expenditure as a proportion of total expenditure on defence R&D fell from 5 per cent in 1989 to 3 per cent in 1993.

Salaries and wages account for a higher proportion of current costs and total costs in civil R&D than in defence R&D.

Regional breakdown of R&D performed in UK businesses, 1993 (table 11)

This table presents the first regional breakdown of UK business R&D. The region with the largest R&D expenditure

is the South East with 56 per cent of the UK total. The second largest region is the North West at around 10 per cent.

The Business Monitor MO14 (see notes) will give a finer regional breakdown and will express the expenditure and employment figures as percentages of regional GDP and labour force respectively.

R&D intensity in manufactured products, 1993 (Table 12)

R&D intensity in each product group is compared by considering the R&D expenditure as a proportion of the total sales of the product group recorded by the CSO's PRODCOM survey. In previous years the denominator in the R&D intensity table was the total sales of businesses classified to industries associated with each product group. The new method gives a better correspondence between R&D expenditure and total sales.

In 1993 R&D expenditure on manufactured products was 2.4 per cent of total sales. Pharmaceuticals, at 21 per cent, had the highest proportion of sales spent on R&D. The second highest was Aerospace at 9 per cent.

NOTES

The 1993 Survey

Sample design

1. The 1993 survey was a benchmark survey. Just over 5,300 forms were sent out - to all businesses above a certain size performing R&D plus a sample of smaller businesses. 5,009 businesses returned completed forms, representing a response rate of 94 per cent. Businesses were selected if they were known to be R&D performers or if, from information gained from various sources, there were indications that R&D activity was likely.

2. Estimates were made for the R&D activity of non-responding and unsampled businesses.

3. Since 1985, there has been a series of 4-yearly benchmark surveys with slimline surveys between. The slimline surveys collected annual information from a fixed panel of the largest R&D performers in the previous

benchmark survey. The 1993 survey was the last benchmark survey. In future years there will be a smaller-scale sample survey based upon a continually updated register of R&D performers.

Changes to 1993 Survey

4. For 1993, changes were made to the survey methods in order to bring the UK in line with international standards and to improve the quality of the data. Specific changes included:

   - Changing the reporting unit from the company group to the individual company.

   - Recording the original source of funds where known. This was introduced to improve the accuracy of reported government R&D spending on defence contracts, including work performed by sub-contractors.

   - The division of overseas funds into EU and other.

   - The request for information on the main location of R&D performed within the business. This has enabled publication for the first time of regional analyses of Business Enterprise R&D expenditure.

   - A new product group classification to bring UK statistics into line with OECD statistical requirements. This reduced the number of product groups from 51 to 33.

Revisions to past data

5. The 1993 survey identified a number of significant new R&D performers, and some companies with large and growing R&D activity, not covered in the slimline panel surveys of 1990, 1991 and 1992. The estimates for these three years have been revised upwards in the light of this new information.

6. When making historical comparisons readers should bear in mind that the most reliable comparisons will be between 1993 and 1989 - the two benchmark survey years.

7. The changed product group classification has altered the way in which some businesses regard their R&D. In

particular the expansion of classifications in the service sector created new categories for R&D consultancy, technical services, and computer services. Some businesses are now recording activity under these new headings that was classified before to manufactured products. Much R&D performed by service industries is carried out to support manufacturing businesses, so R&D classified to the service industry product groups is not necessarily directed at services for consumers. Estimates for years before 1993 have been made on as consistent a basis as possible but should be interpreted as broad indications of product group trends.

More detailed information

8. A more detailed analysis of the results of this survey, and methods used, will be published in a *Business Monitor MO14*, due for release in April 1995. It will be available from HMSO and will cost £9.50.

Definitions

Research and Experimental Development (R&D)

9. R&D and related concepts follow internationally agreed standards defined by the Organisation for Economic Cooperation and Development (OECD) and published in the Frascati Manual. R&D is defined as "Creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of the stock of knowledge to devise new applications".

R&D performed in UK businesses

10. This refers to R&D performed in the UK within business enterprises. It excludes R&D funded by UK businesses that is performed overseas or in other sectors of the UK economy (such as higher education; government departments, agencies, and non-departmental public bodies; local authorities; and private non-profit organisations). Public corporations are counted as business enterprises.

Product groups

11. Respondents are asked to provide separate information on each product group classification. The product

groups used are shown in Table 2. The allocation of R&D to product groups must be regarded as approximate since it is not always straightforward and a single programme of R&D may cover a range of products. Comparisons over time may be affected by differences in the allocation of research programmes to product groups.

12. The broad product groups consist of aggregations of the detailed product groups. "Services" includes some R&D consultancy and other services in support of manufacturing industry.

Employment

13. Employment is calculated by respondents on the basis of 'full-time equivalent' staff averaged over the year. The categories of employment used are:

    - Scientists and Engineers: professionals engaged in the conception or creation of new knowledge, products, methods and systems.

    - Technicians: qualified personnel who participate in R&D projects by performing scientific and technical tasks, normally under the supervision of professional scientists and engineers. They will usually have a scientific or engineering qualification.

    - Administrative and Other: other supporting staff, including skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

Time period to which the results relate

14. Respondents were asked to make a return for the calendar year 1993 or for any business year ending between 6 April 1993 and 5 April 1994. Years referred to in the text of this First Release, and in previous articles in the series (in British Business and Bulletin Issues 12/90, 14/91, 14/92 and 7/93), are similarly defined.

Rounding the figures

15. There may be discrepancies between totals and the sum of their independently rounded components.

1 EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: CASH AND REAL TERMS AND AS A PERCENTAGE OF GDP 1986 TO 1993

£million

		1986	1987	1988	1989	1990	1991	1992	1993
In cash terms	DLBX	5 951	6 335	6 922	7 650	8 318	8 135	8 489	9 126
In real terms (1990 prices)	DLBC	7 728	7 810	7 999	8 263	8 318	7 654	7 681	8 012
Current prices GDP	DLHT	383 632	421 891	469 760	514 241	549 386	573 556	595 219	627 701
As a % of GDP		1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.5

1990 = 100

Source: Central Statistical Office

		1986	1987	1988	1989	1990	1991	1992	1993
GDP deflator used to convert cash terms to real terms	DLKK	77.0	81.1	86.5	92.6	100.0	106.3	110.5	113.9

2 EXPENDITURE ON R&D PERFORMED IN UK BUSINESS ENTERPRISES: DETAILED PRODUCT GROUPS, 1986 TO 1993

		£million								% of total
		1986	1987	1988	1989	1990	1991	1992	1993	1993
TOTAL	DLBX	5 951	6 335	6 922	7 650	8 318	8 135	8 489	9 126	100
Agriculture, hunting and forestry; Fishing	DLBY	69	76	79	89	95	109	130	141	1.5
Extractive Industries	DLBZ	104	113	113	110	115	129	126	62	0.7
Electrical machinery and apparatus	DLCA	463	451	442	426	502	518	523	575	6.3
Radio, television and communication equipment	DLCB	728	574	686	602	688	542	609	658	7.2
Chemicals, man-made fibres. Processing of nuclear fuel	DLCC	518	636	749	767	842	825	840	844	9.2
Pharmaceuticals, medical chemicals and botanical products	DLCD	521	667	825	925	1 185	1 178	1 422	1 651	18.1
Refined petroleum products and coke oven products	DLCE	63	56	68	72	105	102	108	53	0.6
Aerospace	DLCF	830	871	850	1 090	1 124	1 125	1 027	863	9.5
Motor vehicles and parts	DLCG	398	460	486	517	541	576	605	645	7.1
Shipbuilding and repairs	DLCH	11	12	13	17	33	16	16	18	0.2
Other transport equipment	DLCI	10	11	12	14	16	17	18	17	0.2
Casting of iron and steel	DLCJ	38	47	60	45	50	40	43	50	0.5
Non-ferrous metals	DLCK	20	21	23	25	31	24	22	16	0.2
Fabricated metal products	DLCL	49	47	57	55	52	48	63	72	0.8
Precision instruments	DLCM	236	247	276	289	268	276	283	314	3.4
Office machinery and computers	DLCN	307	316	420	497	471	394	379	409	4.5
Other machinery	DLCO	212	245	227	290	322	352	369	488	5.3
Food products and beverages; Tobacco products	DLCP	125	121	113	168	185	185	214	177	1.9
Textiles, clothing and leather products	DLCQ	23	17	19	17	19	23	25	42	0.5
Rubber and plastic products	DLCR	32	36	35	41	46	35	25	67	0.7
Other non-metallic mineral products	DLCS	38	40	43	55	48	39	37	27	0.3
Pulp, paper and paper products; Printing and publishing	DLCT	26	33	30	41	43	38	38	33	0.4
Furniture; Wood and straw products[1]	DLCU	3	3	4	–	–	–	–	8	0.1
Other manufactured goods; Recycling	DLCV	16	18	19	20	21	21	23	21	0.2
Electricity, gas and water supply	DLCW	147	161	167	187	188	192	187	214	2.3
Construction	DLCX	26	25	30	29	19	19	15	11	0.1
Transport and storage	DLCY	4	5	5	6	7	8	10	12	0.1
Post and telecommunications	DLCZ	193	209	210	235	234	247	243	273	3.0
Research and development consultancy; Technical testing and analysis	DLDA	435	477	504	586	600	598	625	855	9.4
Computer and related activities	DLDB	282	315	331	404	435	427	432	477	5.2
Miscellaneous business activities	DLDC	9	9	9	11	11	12	12	14	0.2
Public administration	DLDD	12	13	13	16	15	15	14	11	0.1
Wholesale and retail trade	DLDE	3	3	4	4	4	4	4	5	0.1

[1] From 1989 to 1992 furniture, wood and straw products has been included with pulp, paper and paper products, printing and publishing.

Source: Central Statistical Office

3

EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: BROAD PRODUCT GROUPS, 1986 TO 1993

IN CASH TERMS

£million

		1986	1987	1988	1989	1990	1991	1992	1993	% of total 1993
TOTAL	DLBX	5 951	6 335	6 922	7 650	8 318	8 135	8 489	9 126	100
Manufacturing: Total	DLDF	4 604	4 873	5 389	5 901	6 490	6 273	6 583	6 996	76.7
Chemicals	DLDG	1 039	1 303	1 574	1 692	2 027	2 003	2 262	2 495	27.3
Mechanical engineering	DLDH	261	292	284	345	374	400	433	560	6.1
Electrical machinery	DLDI	1 498	1 341	1 548	1 525	1 662	1 454	1 511	1 643	18.0
Transport equipment	DLDJ	419	483	511	548	590	609	640	681	7.5
Aerospace	DLDK	830	871	850	1 090	1 124	1 125	1 027	863	9.5
Other manufacturing	DLDL	557	583	622	701	713	682	711	755	8.3
Services	DLDM	1 347	1 462	1 533	1 749	1 828	1 861	1 907	2 130	23.3

Source: Central Statistical Office

3A

EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: BROAD PRODUCT GROUPS, 1986 TO 1993

IN REAL TERMS (1990 PRICES)

£million

		1986	1987	1988	1989	1990	1991	1992	1993
TOTAL	DLBC	7 728	7 810	7 999	8 263	8 318	7 654	7 681	8 012
Manufacturing: Total	DLBT	5 978	6 008	6 227	6 374	6 490	5 902	5 956	6 142
Chemicals	DLBU	1 349	1 604	1 819	1 828	2 027	1 885	2 046	2 191
Mechanical engineering	DLHU	339	360	328	373	374	377	392	492
Electrical machinery	DLHV	1 945	1 653	1 789	1 647	1 662	1 368	1 367	1 443
Transport equipment	DLHW	544	595	590	592	590	573	579	598
Aerospace	DLHX	1 078	1 074	982	1 177	1 124	1 058	929	758
Other manufacturing	DLHY	723	719	719	757	713	642	643	663
Services	DLHZ	1 749	1 802	1 771	1 889	1 828	1 751	1 725	1 870

Source: Central Statistical Office

4 SOURCES OF FUNDS FOR R&D PERFORMED WITHIN UK BUSINESSES: 1986 TO 1993

		1986	1987	1988	1989	1990	1991	1992	1993
£ MILLION									
TOTAL	DLBX	5 951	6 335	6 922	7 650	8 318	8 135	8 489	9 126
UK Government	DLDO	1 392	1 267	1 177	1 312	1 392	1 189	1 171	1 163
Overseas total of which:	DLHK	727	760	831	1 023	1 289	1 299	1 270	1 401
EC Overseas	DLDQ	..	..	..	..	..	..	..	220
Other Overseas	DLDS	..	..	..	..	..	..	..	1 181
Other UK Business	DLDU	..	..	..	535	478	498	565	619
Other UK Business & Own funds	DLHM	3 832	4 308	4 914	..	..	..	..	..
Own funds	DLDW	..	..	..	4 780	5 160	5 149	5 483	5 866
Other[1]	DLDY	..	..	..	..	..	..	..	78

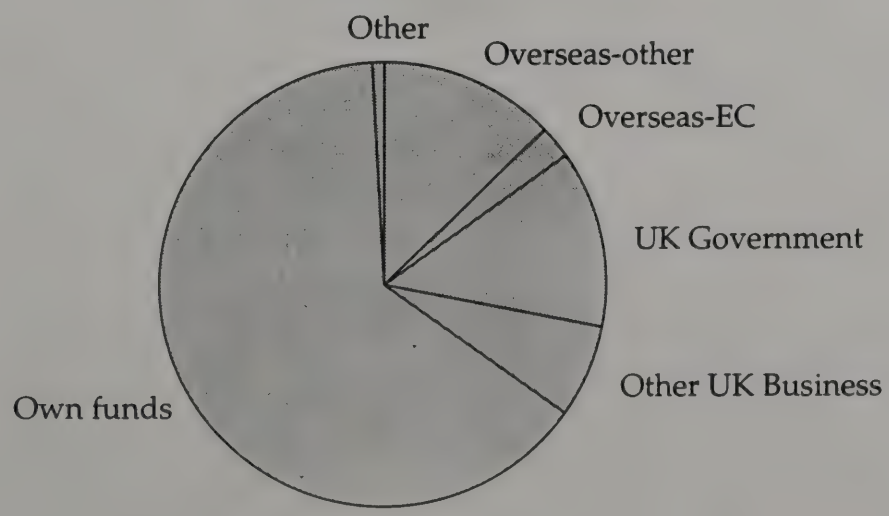
[1] From 1986 to 1992 "other funds" was included with own funds

		1986	1987	1988	1989	1990	1991	1992	1993
PERCENT									
TOTAL	DLDN	100	100	100	100	100	100	100	100
UK Government	DLDP	23	20	17	17	17	15	14	13
Overseas total of which:	DLHL	12	12	12	13	15	16	15	15
EC Overseas	DLDR	..	..	..	..	..	..	..	2
Other Overseas	DLDT	..	..	..	..	..	..	..	13
Other UK Business	DLDV	..	..	..	7	6	6	7	7
Other UK Business & Own funds	DLHN	65	68	71	..	..	..	..	..
Own funds	DLDX	..	..	..	62	62	63	65	64
Other[1]	DLDZ	..	..	..	..	..	..	..	1

[1] From 1986 to 1992 "other funds" was included with own funds.

Source: Central Statistical Office

Sources of funds for business R&D, 1993



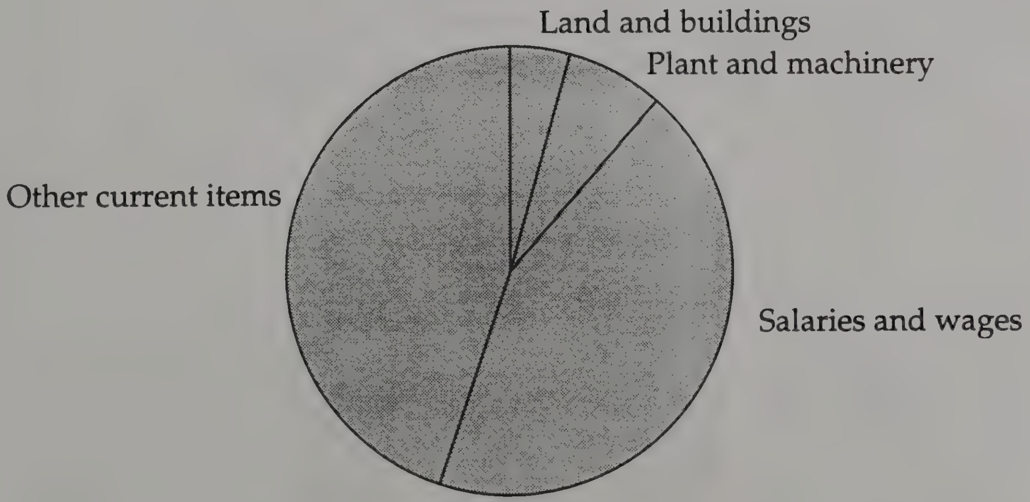
5 CURRENT AND CAPITAL EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: 1986 TO 1993

£million

		1986	1987	1988	1989	1990	1991	1992	1993
TOTAL	DLBX	5 951	6 335	6 922	7 650	8 318	8 135	8 489	9 126
Capital total of which:	DLEA	541	618	676	838	845	768	898	1 042
Land and building	DLHO	..	..	..	241	..	..	..	397
Plant and machinery	DLHQ	..	..	..	596	..	..	..	645
Current total of which:	DLEC	5 410	5 717	6 246	6 812	7 473	7 367	7 591	8 085
Salaries and wages	DLEE	2 535	2 640	2 865	3 228	3 499	3 511	3 673	3 998
Other	DLEG	2 875	3 077	3 381	3 584	3 974	3 856	3 919	4 087

Source: Central Statistical Office

Current and capital expenditure on business R&D, 1993



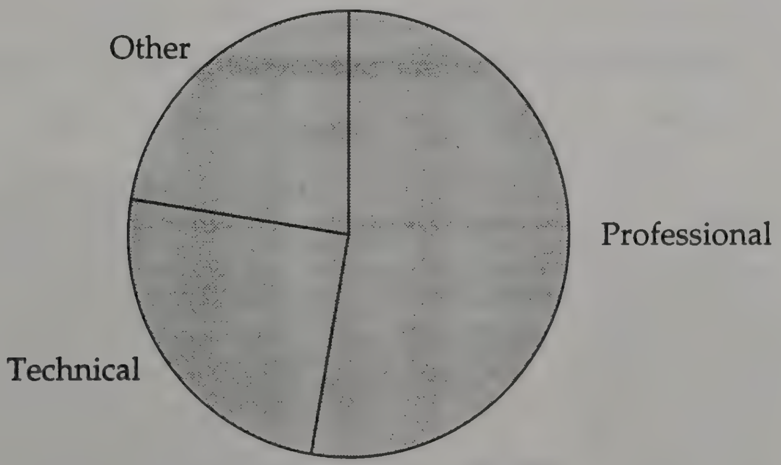
6 EMPLOYMENT ON R&D PERFORMED WITHIN UK BUSINESSES: 1986 TO 1993

Full time equivalent in thousands

		1986	1987	1988	1989	1990	1991	1992	1993
TOTAL	DLEI	188	185	185	176	171	159	159	165
Scientists and engineers	DLEJ	87	87	89	85	83	80	82	87
Technicians, laboratory assistants and draughtsmen	DLEK	49	49	46	46	43	38	38	41
Administrative, clerical industrial and other staff	DLEL	52	49	50	45	45	41	39	37
As % of total employment									
Scientists and engineers	DLEM	46	47	48	48	48	50	51	53
Technicians, laboratory assistants and draughtsmen	DLEN	26	26	25	26	25	24	24	25
Administrative, clerical industrial and other staff	DLEO	28	26	27	26	27	26	25	22

Source. Central Statistical Office

Employment on business R&D, 1993



Professional = Scientists and engineers, Technical = Technicians, lab assistants and draughtsmen,
Other = Admin, clerical, industrial and other staff

7 EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN UK BUSINESSES BY BROAD PRODUCT GROUPS, 1989 TO 1993

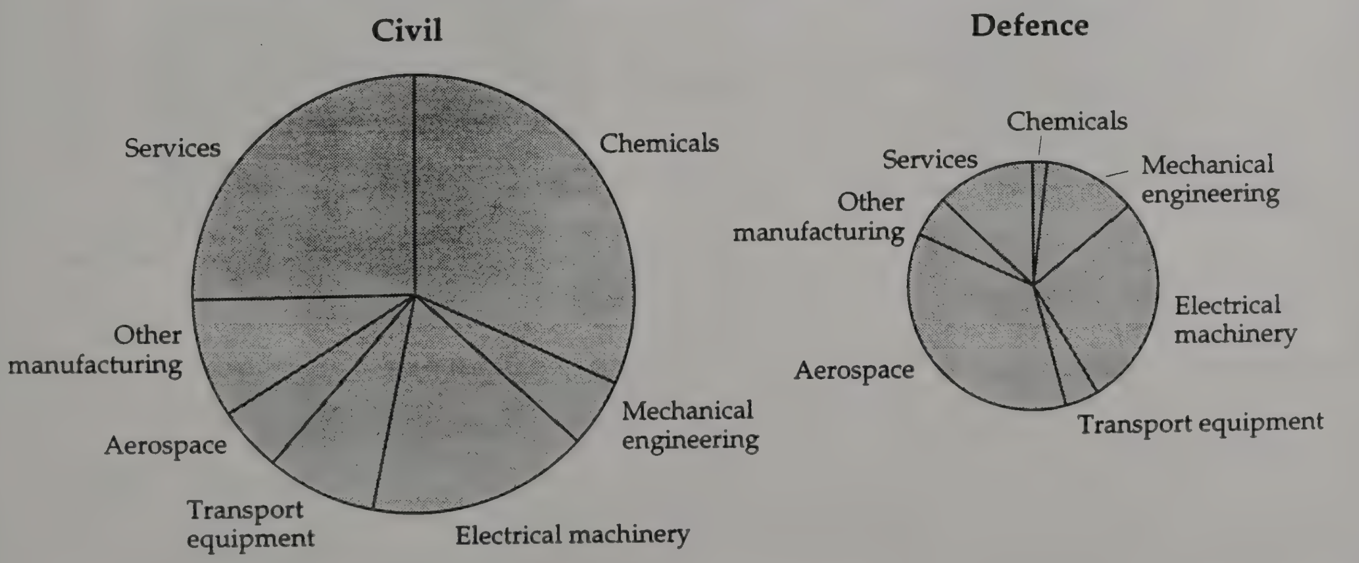
£million

		Civil						Defence				
		1989	1990	1991	1992	1993		1989	1990	1991	1992	1993
In cash terms												
TOTAL	DLBV	5 923	6 557	6 669	7 092	7 767	DLBW	1 727	1 761	1 466	1 397	1 359
Manufacturing	DLEP	4 339	4 892	4 969	5 326	5 809	DLEX	1 562	1 598	1 304	1 256	1 187
Chemicals	DLEQ	1 673	2 013	1 986	2 242	2 469	DLEY	19	14	17	20	26
Mechanical engineering	DLER	257	237	263	326	396	DLEZ	88	137	137	107	164
Electrical machinery	DLES	986	1 147	1 099	1 153	1 268	DLFA	539	516	355	358	375
Transport equipment	DLET	491	525	550	575	622	DLFB	57	65	59	64	59
Aerospace	DLEU	335	357	478	404	372	DLFC	755	767	647	623	491
Other manufacturing	DLEV	597	613	592	626	682	DLFD	104	100	90	84	73
Services	DLEW	1 584	1 666	1 700	1 766	1 959	DLFE	165	163	162	141	172

		Civil						Defence				
		1989	1990	1991	1992	1993		1989	1990	1991	1992	1993
In real terms (1990 prices)												
TOTAL	DLBA	6 398	6 557	6 274	6 417	6 819	DLBB	1 865	1 761	1 379	1 264	1 193
Manufacturing	DLBD	4 686	4 892	4 675	4 819	5 100	DLBL	1 687	1 598	1 227	1 137	1 042
Chemicals	DLBE	1 807	2 013	1 869	2 028	2 168	DLBM	21	14	16	18	23
Mechanical engineering	DLBF	278	237	248	295	348	DLBN	95	137	129	96	144
Electrical machinery	DLBG	1 065	1 147	1 034	1 043	1 113	DLBO	583	516	334	324	329
Transport equipment	DLBH	530	525	518	521	546	DLBP	62	65	56	58	52
Aerospace	DLBI	362	357	449	365	327	DLBQ	815	767	609	564	431
Other manufacturing	DLBJ	645	613	557	567	599	DLBR	112	100	85	76	64
Services	DLBK	1 711	1 666	1 599	1 598	1 720	DLBS	178	163	152	127	151

Source: Central Statistical Office

Civil and defence R&D expenditure by broad product groups, 1993

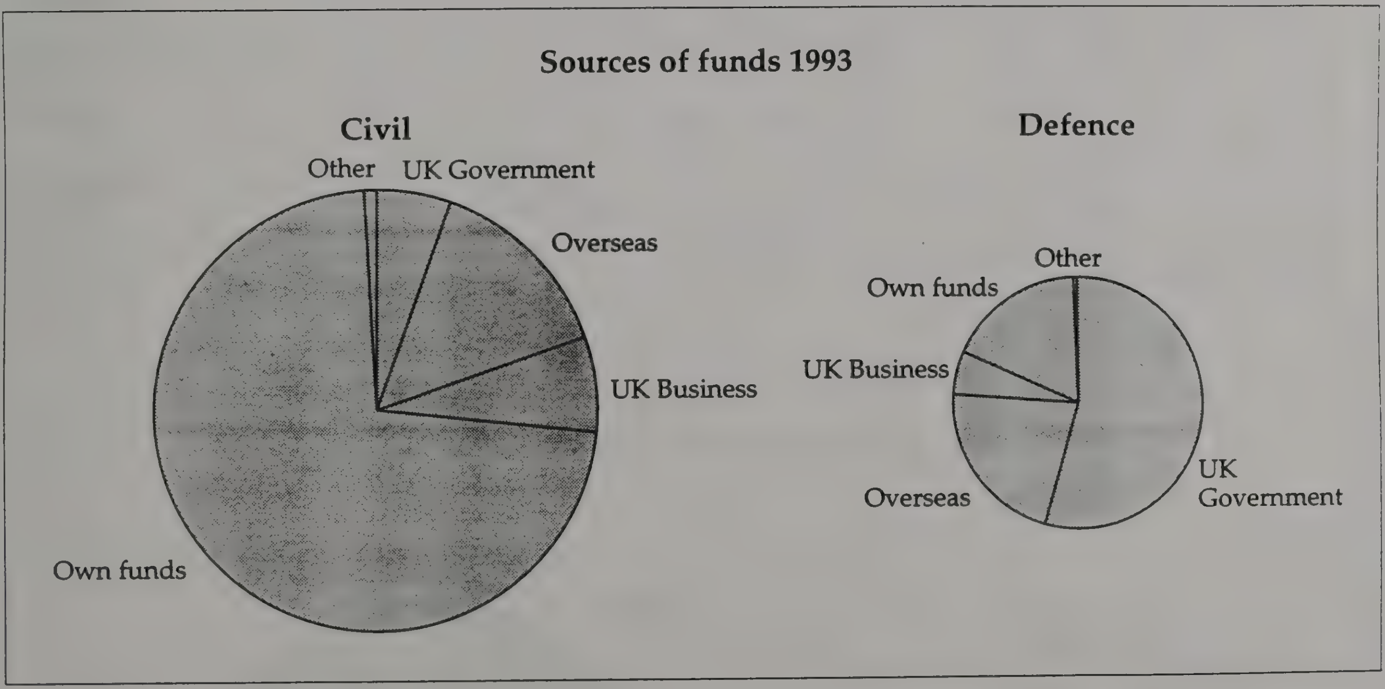


8 SOURCES OF FUNDS FOR CIVIL AND DEFENCE R&D IN UK BUSINESSES: 1989 TO 1993

£million

		Civil						Defence				
		1989	1990	1991	1992	1993		1989	1990	1991	1992	1993
UK Government	DLFG	306	428	479	478	425	DLFN	1 007	964	710	693	739
Overseas total of which:	DLHS	739	904	950	981	1 106	DLIF	284	385	349	289	295
EC Overseas	DLFH	..	..	..	.	182	DLFO	..	..	..	..	38
Other Overseas	DLFI	.	..	..	..	924	DLFP	..	..	..	..	257
Other UK Business	DLFJ	473	414	382	430	542	DLFQ	62	64	116	135	76
Own	DLFK	4 406	4 813	4 858	5 203	5 623	DLFR	374	347	291	280	242
Other	DLFL	..	..	..	..	71	DLFS	..	..	..	..	6
TOTAL	DLBV	5 923	6 557	6 669	7 092	7 767	DLBW	1 727	1 761	1 466	1 397	1 359

Source: Central Statistical Office

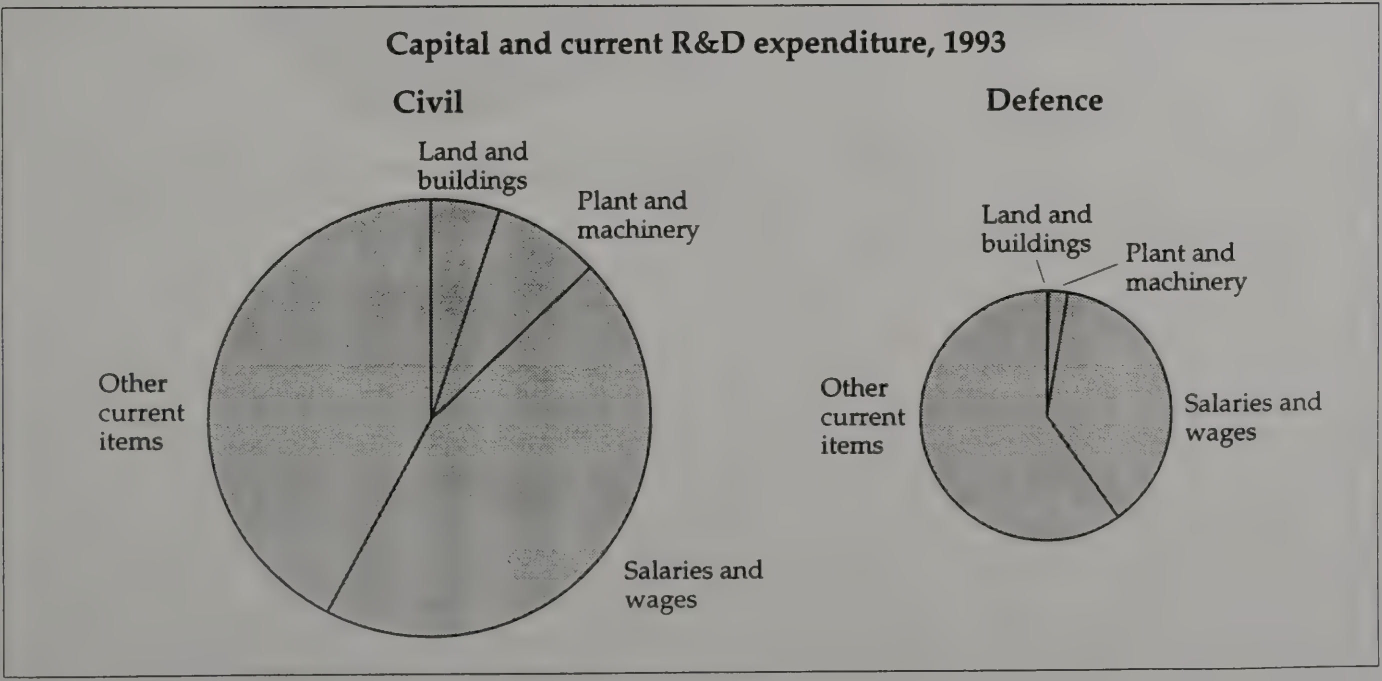


9 CURRENT AND CAPITAL EXPENDITURE ON CIVIL AND DEFENCE R&D IN UK BUSINESSES: 1989 TO 1993

		Civil						Defence				
		1989	1990	1991	1992	1993		1989	1990	1991	1992	1993
£MILLION												
Capital total of which:	DLGJ	758	792	725	861	1 006	DLGT	80	53	43	37	36
Land & building	DLIH	235	–	–	–	394	DLIL	6	–	–	–	3
Plant & machinery	DLIJ	523	–	–	–	612	DLIN	74	–	–	–	33
Current total of which:	DLGP	5 165	5 766	5 944	6 230	6 762	DLGZ	1 647	1 707	1 423	1 361	1 323
Salaries & Wages	DLGL	2 599	2 902	3 021	3 163	3 487	DLGV	629	597	490	510	511
Other	DLGN	2 566	2 864	2 923	3 068	3 275	DLGX	1 018	1 110	933	851	812
TOTAL	DLBV	5 923	6 557	6 669	7 092	7 767	DLBW	1 727	1 761	1 466	1 397	1 359

		Civil						Defence				
		1989	1990	1991	1992	1993		1989	1990	1991	1992	1993
PERCENT												
Capital total of which:	DLGK	13	12	11	12	13	DLGU	5	3	3	3	3
Land & building	DLII	4	–	–	–	5	DLIM	1	–	–	–	–
Plant & machinery	DLIK	9	–	–	–	8	DLIO	4	–	–	–	3
Current total of which:	DLGQ	87	88	89	88	87	DLHA	95	97	97	97	97
Salaries & Wages	DLGM	44	44	45	45	45	DLGW	36	34	33	37	38
Other	DLGO	43	44	44	43	42	DLGY	59	63	64	61	60
TOTAL	DLFT	100	100	100	100	100	DLGA	100	100	100	100	100
Salaries as a % Current		50	50	51	51	52		38	35	34	37	39

Source: Central Statistical Office



Capital and current R&D expenditure, 1993

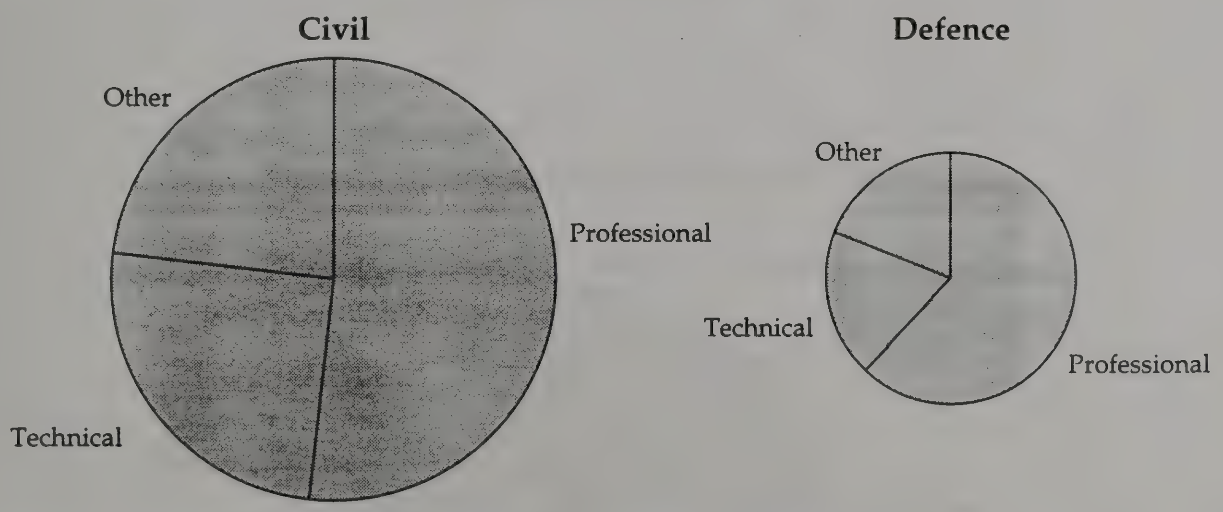
10 EMPLOYMENT ON CIVIL AND DEFENCE R&D PERFORMED WITHIN UK BUSINESSES: 1989 TO 1993

Full time equivalent in thousands

		Civil						Defence				
		1989	1990	1991	1992	1993		1989	1990	1991	1992	1993
Scientist and engineers	DLHD	66	67	68	69	74	DLHH	19	16	12	13	13
Technicians laboratory assistants & draughtmen	DLHE	37	35	31	32	36	DLHI	9	8	7	6	4
Admin. clerical industrial & other staff	DLHF	36	36	34	33	33	DLHJ	9	9	7	6	4
TOTAL	DLHC	138	138	133	133	143	DLHG	38	33	26	26	22

Source: Central Statistical Office

1993 R&D employment

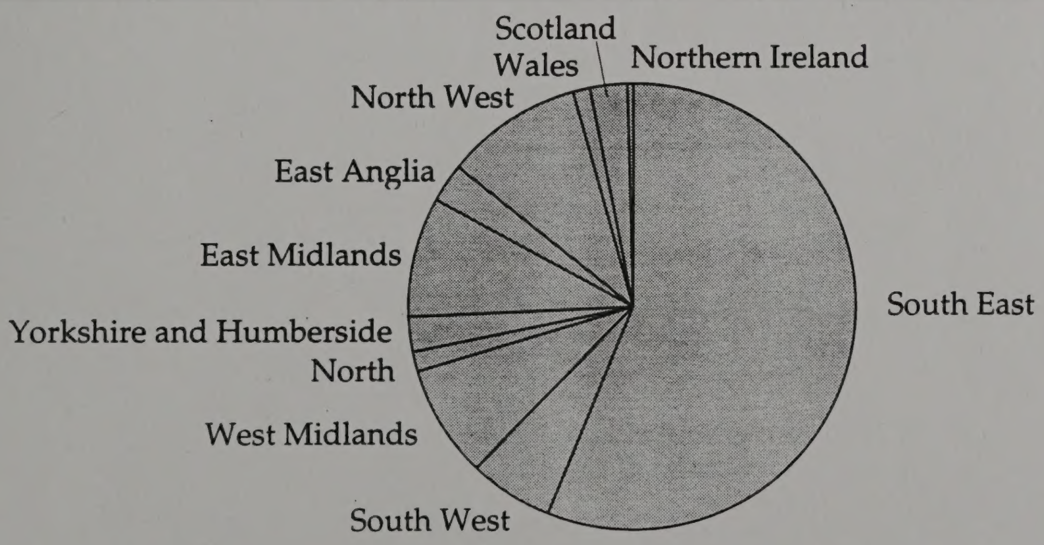


Professional = Scientists & engineers, Technical = Technicians, lab assistants & draughtsmen
Other = Admin. clerical industrial and other

11 REGIONAL BREAKDOWN OF R&D PERFORMED WITHIN UK BUSINESSES: 1993

		Expenditure £million 1993		Employment full time equivalent 1993
Regions				
South West	DLJM	553	DLJX	11
West Midlands	DLJN	744	DLJY	17
North	DLJO	131	DLJZ	3
Yorkshire and Humberside	DLJP	231	DLKA	6
East Midlands	DLJQ	790	DLKB	14
East Anglia	DLJR	257	DLKC	5
North West	DLJT	899	DLKE	17
South East	DLJS	5 124	DLKD	83
of which:				
Greater London	DLKL	996	DLKM	21
Total England	DLKI	8 730	DLKJ	157
Wales	DLJU	113	DLKF	3
Scotland	DLJV	245	DLKG	5
Northern Ireland	DLJW	39	DLKH	1
UK TOTAL	DLBX	9 126	DLEI	165

Regional breakdown for business R&D, 1993



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R&D INTENSITY IN MANUFACTURED PRODUCTS, 1993

		R&D expenditure £million 1993		R&D as a percent of sales 1993
Manufacturing: TOTAL	DLDF	6 996	DLIQ	2.4
Electrical machinery and apparatus	DLCA	575	DLIR	5.9
Radio, television and communication equipment	DLCB	658	DLIS	7.5
Chemicals, man-made fibres. Processing of nuclear fuel	DLCC	844	DLIT	2.8
Pharmaceuticals, medical chemicals and botanical products	DLCD	1 651	DLIU	21.0
Aerospace	DLCF	863	DLIV	8.7
Motor vehicles and parts	DLCG	645	DLIW	2.9
Shipbuilding and repairs	DLCH	18	DLIX	0.7
Other transport equipment	DLCI	17	DLIY	0.7
Casting of iron and steel	DLCJ	50	DLIZ	0.7
Non-ferrous metal	DLCK	16	DLJA	0.3
Fabricated metal products	DLCL	72	DLJB	0.4
Precision instruments	DLCM	314	DLJC	4.4
Office machinery and computers	DLCN	409	DLJD	6.4
Other machinery	DLCO	488	DLJE	2.1
Food products and beverages; Tobacco products	DLCP	177	DLJF	0.3
Textiles, clothing and leather products	DLCQ	42	DLJG	0.3
Rubber and plastic products	DLCR	67	DLJH	0.6
Other non-metallic mineral products	DLCS	27	DLJI	0.3
Pulp, paper and paper products; Printing and publishing	DLCT	33	DLJJ	0.1
Furniture; Wood and straw products	DLCU	8	DLJK	0.1
Other manufacturing goods; Recycling	DLCV	21	DLJL	0.9